GLAST GSI Beam Test

Completed Summary

4 – 19 July 2000

Hotel/Environment

Best Western Parkhaus Hotel: From A5 at Darmstadt Kreuz exit toward Darmstadt Stadtmitte which gets you onto Rheinstrasse. Turn right on to Grafenstrasse. Hotel is in 1st block behind stores. Look for sign to turn right into parking garage. Hotel is above parking garage. Enter garage and go up to 9th floor. Entry to Hotel reception is there. Parking is 12 DM per nite, hotel desk will give you exit coupon in the morning when you present the ticket you received on entering the garage.

Rooms are fine – no air conditioning. It's been 20 – 25 deg C during the days, generally rainy or overcast. Jackets are good idea. You might want to bring a bar of bath soap and shampoo if you don't like liquid soap dispensers.

Lots of good restaurants around the hotel area.

All stores close at 4 PM on Saturdays and about 7 PM during the week. All closed Sunday. Snack bar at GSI is open during the week until 7PM, closed on weekend. Lesson – food is hard to find on the weekends without prior preparation. Pizza place in Wixhausen is not far away and open 'til 11 PM. We have takeout menu and you can call ahead to order.

GSI Logistics

Radiation badges and forms for Eric, Tony and Patty are on the GLAST operations desk. I will train you in the controlled access procedure. You will likely also need someone from GSI to give you the "safety" lecture.

Someone should immediately get training for operation of the overhead crane. You have to be on the approved list to obtain the remote control for it. You can only check out the remote from its custodian during about 15 min intervals out of every 80 minutes on some strange schedule which stops around 3PM – message: plan ahead.

Snack bar is open during the week from 7AM – 7 PM. It closes for an hour at 1:30 PM. Serves breakfast and lunch. Never have seen a dinner there, but I think they serve that as well. Food is adequate – like NRL snackbar in variety and quality.

Shipment

Everything arrived in pretty good shape. Need to work with GSI shipping for return process. Must exit thru customs the same way that it entered. Talk to NRL shipping about how to work this at NRL end.

Missing all sorts of office supplies. Using A4 paper bummed from GSI.

Test Configuration and Disassembly

Notes on assembly sequence are in the log book.

From our measurements, the side-mounted control card configuration of the calorimeter should fit in the shipping container, after the shorter brass shipping legs are mounted on the calorimeter. Two of the shipping bolts will be obscured from above, but there is enough space to get to them from underneath.

1. First make sure the card-holder bolts and standoffs are firmly tight.

2. Then remove 4 cables to the TEM. Unbolt Nanonics connectors on the calorimeter using the two small red-tipped handle drivers (stored in clear compartment box), simultaneously unscrewing both connector screws. Then remove other end of cables at TEM (right angle allen wrench in same clear box). This cable goes in a bag, in the TEM shipping box.

3. Firm up card holders by tightly wrapping tape around the calorimeter.

If the cards have to be mounted underneath for shipping:

1. Remove 4 cables to the TEM. Unbolt Nanonics connectors on calorimeter using the two small red-tipped handle drivers (stored in clear compartment box), simultaneously unscrewing both connector screws. Then remove other end of cables at TEM (right angle allen wrench in same clear box). This cable goes in a bag, in the TEM shipping box.

2. Remove aluminum supporting frame, and 1 inch standoffs from below calorimeter.

3. Install 4 short ¼ inch standoffs into bottom of calorimeter frame, do not fully tighten.

4. Install cards using ½ inch standoffs between cards. Order of cards unimportant. Standoffs may be difficult to get started.

5. Tape up wiring to bottom of calorimeter, kapton tape is good. Wrap anti-static bag plastic underneath bottom of calorimeter and tape. (anti-static plastic in clear compartment box).

Test Operations

Logging TEM data on G6-500 PC (ossef). Logging to \\ossef\D:\GSI_00. When data has been archived to CD Rom, I move it to D:\GSI_00\Archived.

Logging Bart data on the P5-120 (osser3) of course. It goes into \\osser3\D:\apps\camac. At appropriate intervals, I copy the data files onto ossef, into the same directory: \\ossef\D:\GSI_00. I delete the files from osser3 after successful copy.

I've been making CDs on the G6-200 (ossepl). I copy the data from ossef onto \\ossepl\E:\GSI_00. I've been writing CDs at 4x speed without problem. When CD is complete, I delete the files from ossepl and move the files on ossef to the archived subdirectory.

All documentation and Forms are in the My Documents directory on ossef.

Known Problems with calGSE Program

1. Rate display does not correctly align the two ends of the logs. There is a mirror image between the X+ and X- displays (the X+ display is correct). Similarly for the Y+/Y- rate displays (although the Y- display is correct).

2. Loading command scripts after logging data to a disk drive/directory other than C:\apps\calgse. The program fails to find the requested command scripts and nested scripts.

   Solution: Open a dummy data logging file on C:\apps\calGSE and then immediately close it. This changes the default file location back to C:\apps\calGSE

As Run Tests (chronological order) and Deviations from Test Plan

We needed at least one, maybe two, additional days to set up and prepare for the test. Consequently..

Experiment 1

Electronic calibration has NOT been done. No intlins.

No time to try to adjust LEX4 discriminator level.

These tests could be run before the start of Ni runs.

Checkout of the Test box was minimal. More check out is needed. Plastics are OK.

Experiment 2

Did two muon runs with Calorimeter – asynchronously from Bart. Both runs vertical orientation. No attempt to lower LEX4 discriminators. Ran Check program on one of them. Plot of variation from april is in log book.

Attempted muon run with test box in Beam Test configuration – normal to beam line. Camac blew a breaker over night (mu3.dat), retried during the day (mu3b.dat) and that's all we know about the CsI test box performance. I looked briefly at the file but not close enough to tell if everything is right.

NOTE: these early bart runs have a different record from all others… These have 48 longs per record. The new format is 49 longs per record, the 1st long is a time stamp in milliseconds.

Bart runs used gsi00m3.par.

Experiment 3

Started testing with Carbon at 400 MeV – one run only for tuning the beam. The upstream paddle is the beam monitor for the control room. All caen config files were changed to shape the paddle with shape = 0.

Switched to Carbon at 700 MeV/amu for the scanning.

3A. 700 MeV, 0 deg, No Poly

Scanned on log 5 from 0 -> 18.1 cm on the fiducal. Not supported by Bart. Beam peak rate (/sec) about 300 Hz. Runs 003 – 011.

Scanned on log 3 from 0 -> 24.3 cm on the fiducal. Not supported by Bart. Peak rate ~ 500 Hz. Runs 012 – 021.

Scanned on log 7 from 0 -> 11.9 cm on the fiducal. Not supported by Bart. Peak rate ~500 Hz. Runs 022 – 031.

3CPrime. 700 MeV, 25 deg No Poly

Angle is 25 degs, not 30. Table height is 3.4 cm on fiducial – lowest possible position. Beam enters calorimeter on log 3rd log from edge on top of cal.

NOTE: **Bart is NOW running MCA_DEW2 with modified output record format**. Event record is 49 longs – 1st long is time in milliseconds since windows was booted, ie. Time of day. This time can be used to correlate with TEM 20MHz timestamp on events. Timing should be ok except for event latency in bart, lost events in bart, and drift of the clocks. Should be able to sync up leading edge of supercycles and figure it out from there.

Plastic Configuration

Adjusted gains on plastic PMTs via HVPS voltage change and Caen config change. RC032.DAT and BC032, 032a are test configurations.

Paddle HV = 1300 V

Veto 1-2 HV = 1050 V

Veto 3-4 HV = 1150 V

Modified caen_gsi_c2.pro and caen_gsi_c3.pro to increase shaper coarse gain for plastics by one. NOTE: nickel files have not been changed.

Running for the first time, gsi00c3.par

Peak rate in beam spill is ~500 Hz.

Runs 033 – 042.

3C. 700 MeV, 25 deg, 3 Inches of Poly

Angle is 25 degs, not 30. Table height is 3.4 cm on fiducial – lowest possible position. Beam enters calorimeter on log 3rd log from edge on top of cal. Three layers of poly are placed ~6 inches in front of upstream paddle.

Requested reduction in beam intensity to 1400 – 1500 particles per spill. Adjusted slow extraction profile to better flat top, peak rate is ~200 Hz.

Runs 043 – 052.

Experiment 4

It turns out that changing energy is not very hard so we optimize based on controlled accesses.

4C. 400 MeV, 25 deg, 3 Inches of Poly

Angle is 25 degs, not 30. Table height is 3.4 cm on fiducial – lowest possible position. Beam enters calorimeter on log 3rd log from edge on top of cal. Three layers of poly are placed ~6 inches in front of upstream paddle.

Runs 053 – 062.

4C. 400 MeV, 25 deg, No Poly

Angle is 25 degs, not 30. Table height is 3.4 cm on fiducial – lowest possible position. Beam enters calorimeter on log 3rd log from edge on top of cal.

Runs 063 – 072.

4C. 500 MeV, 25 deg, No Poly

Angle is 25 degs, not 30. Table height is 3.4 cm on fiducial – lowest possible position. Beam enters calorimeter on log 3rd log from edge on top of cal.

Runs 073 – 082.

4C. 500 MeV, 25 deg, 3 Inches of Poly

Angle is 25 degs, not 30. Table height is 3.4 cm on fiducial – lowest possible position. Beam enters calorimeter on log 3rd log from edge on top of cal. Three layers of poly are placed ~6 inches in front of upstream paddle.

Runs 083 – 092.

4B. 500 MeV, 0 deg, 3 Inches of Poly

Angle is 0 degs. Table height is 18.1 cm on fiducial. Beam enters calorimeter on log 5 (counting from 0). Three layers of poly are placed ~6 inches in front of upstream paddle.

Runs 093 – 102.

4A. 500 MeV, 0 deg, No Poly

Angle is 0 degs. Table height is 18.1 cm on fiducial. Beam enters calorimeter on log 5 (counting from 0).

Runs 103 – 112.

4A. 528 MeV, 0 deg, No Poly

Angle is 0 degs. Table height is 18.1 cm on fiducial. Beam enters calorimeter on log 5 (counting from 0).

Runs 113 – 122.

4B. 528 MeV, 0 deg, 3 Inches of Poly

Angle is 0 degs. Table height is 18.1 cm on fiducial. Beam enters calorimeter on log 5 (counting from 0). Three layers of poly are placed ~6 inches in front of upstream paddle.

Runs 123 – 132.

3D. 700 MeV, 35 deg, 3 Inches of Poly

Angle is 35 deg, not 60 degs. Even with 35 degrees we miss the top layer of logs. Interestingly enough we appear to be hitting the PIN in the 2nd layer. Table height is 3.4 cm on fiducial – lowest possible position. Beam enters calorimeter on log 2nd layer. Three inches of poly are placed ~6 inches in front of upstream paddle. Sampling 6 positions at logs 0,1,3,6,8,9.

Runs 133 - 138.

3DPrime. 700 MeV, 35 deg, No Poly

Angle is 35 deg, not 60 degs. Even with 35 degrees we miss the top layer of logs. Interestingly enough we appear to be hitting the PIN in the 2nd layer. Table height is 3.4 cm on fiducial – lowest possible position. Beam enters calorimeter on log 2nd layer. Nothing upstream of paddle. Sampling 6 positions at logs 0,1,3,6,8,9.

Runs 139 - 144. RC144 is missing for some reason.

3B. 700 MeV, 0 deg, 3 Inches of Poly

Angle is 0 degs. Table height is 18.1 cm on fiducial. Beam enters calorimeter on log 5 (counting from 0). Three layers of poly are placed ~6 inches in front of upstream paddle.

Runs 145 – 154.

3F. 700 MeV, Test Box, 0 deg, No Poly

Installed test box. First changed box to ALL ev5092. Appears that center vertical log is at pot value 1600/

Modified caen_gsi_c2.pro and resulting caen_c2.par to increase the gain by one on CsI signals. Big PIN coarsegain 4 -> 5, small PIN 6->7.

Test runs to debug bad channels. 1st Philips ADC, 1 – 4 and 10 – 12 (I think) were bad – no pedestal… no connections. Chann 19 had preamp misconnected, replaced preamp on chan 8.

NOTE: Did not modify Bart trigger. We are triggering off the Cal L1t. Can't scan the entire length of the 37 cm bar.

Angle is 0 degs. Table height is 18.1 cm on fiducial. Beam enters calorimeter on log 5 (counting from 0). Three layers of poly are placed ~6 inches in front of upstream paddle. Ran grid centered on 5 Test box logs.

Runs 155 – 166

3F. 700 MeV, Test Box, 0 deg, No Poly

Angle is 0 degs. Table height is 24.3 cm on fiducial. Beam enters calorimeter on log 5 (counting from 0). Three layers of poly are placed ~6 inches in front of upstream paddle. Ran grid centered on 5 Test box logs.

Runs 167 – 176

3E. 528 MeV, Test Box, 0 deg, 3 Inches of Poly

Angle is 0 degs. Table height is 24.3 cm on fiducial. Beam enters calorimeter on log 5 (counting from 0). Three layers of poly are placed ~6 inches in front of upstream paddle. Ran grid centered on 5 Test box logs.

Runs 178 – 190

Table height is 18.1 cm on fiducial. Beam enters calorimeter on log 5 (counting from 0). Three layers of poly are placed ~6 inches in front of upstream paddle. Ran grid centered on 5 Test box logs.

Runs 191 – 201

Run 196 is 120k Events, ie. 6 times longer.

Table height is 11.9 cm on fiducial. Beam enters calorimeter on log 7 (counting from 0). Three layers of poly are placed ~6 inches in front of upstream paddle. Ran grid centered on 5 Test box logs.

Runs 202 – no data collected but the file is archived.

Second Team beginning 15 July

Checking Beam size. Carbon 528 MeV, Test box, No Poly

Runs 203 – 205. Scanned to find center: gap between Y3 and Y4 is ~1583 ohms

Experiment 3

3E. 528 MeV, Test Box, 0 deg, No Poly

Angle is 0 degs. Table height is 11.9 cm on fiducial. Beam enters calorimeter on log 7 (counting from 0). Ran grid centered on 5 Test box logs.

Runs 206 - 216

3E. 528 MeV, Test Box, 0 deg, 3 Inches of Poly

Angle is 0 degs. Table height is 11.9 cm on fiducial. Beam enters calorimeter on log 7 (counting from 0). Three layers of poly are placed ~6 inches in front of upstream paddle. Ran grid centered on 5 Test box logs.

Runs 217 – 222.

3E. Fast Shaping, 528 MeV, Test Box, 0 deg, 3 Inches of Poly

Angle is 0 degs. Table height is 11.9 cm on fiducial. Beam enters calorimeter on log 7 (counting from 0). Three layers of poly are placed ~6 inches in front of upstream paddle.

Runs 223. CAEN Shaping is level 1. Pot 1661

3E. Fast Shaping, 528 MeV, Test Box, 0 deg, No Poly

Angle is 0 degs. Table height is 11.9 cm on fiducial. Beam enters calorimeter on log 7 (counting from 0).

Runs 224. CAEN Shaping is level 1. Pot 1661.

Experiment 2

** Removed Test Box **

2B. Muons in Test Box with eV5092s and in Calorimeter.

Restored Test Box shaping time: returned to shape-time 3 = 6 us. Angle is 90 degs. Test Box laid flat on its back, upstream logs above downstream logs. Calorimeter is Z up. Test Box is normal to vertical but at the side. Independent data systems.

Runs: calmuons0715.dat (cal), muon0715.dat (test box)

** Remounted Test Box **

Experiment 1

1A. Electronic intlin calibration

Adjusted LEX4 discriminator to optimize triggering on charge injection. Lowered all discriminators as far as possible to accept the dac=5 pulse but not free-run on noise.

Runs: intlin*b_0715.dat and intlin*s_0715.dat.

Experiment 4

4C. 700 MeV, 40 deg, No Poly

Angle is 40 degs. Table height is 3.4 cm on fiducial – lowest possible position. Beam enters calorimeter bottom four layers

Runs 225 – 227.

Experiment 3

3F. 700 MeV, Test Box, 0 deg, No Poly

Scanned on log 4 from 0 -> 21.2 cm on the fiducial. Beam peak rate (/sec) about 200 Hz.

Runs 228 – 233.

Experiment 1

1A. Electronic intlin calibration

Added dac 15 step to small-PIN intlin test sequence and repeated small PIN.

Runs intlin*s_0717.dat.

** End of Carbon beam **

** Begin Nickel beam **

Plastic Configuration

Adjusted gains on plastic paddle PMT via HVPS voltage change and Caen config change. For C beam, we had plastic paddle HV at +1300V and coarse gain 3 to put C peak at 2500 bins. For Ni, setting plastic paddle HV at +1100V and coarse gain 0 should put Fe peak near 1800 bins.

Paddle HV = +1100 V

Modified caen_gsi_Ni2.pro to increase shaper coarse gain for plastics by one.

5A. 700 MeV/n Ni, Test Box, 0 deg, no poly.

Angle is 0 degs. Table height is 21.2 cm on fiducial. Beam enters test box at horizontal 1/6, counting from 0. Beam fragments enter calorimeter in a big splat. No poly upstream. Run positions 4 (1424Ω), 6 (1542Ω), 7 (1601Ω), 9 (1719Ω). 30k triggers at each position. Long exposure (100k) at position 6.

Runs BN300.dat and RN300.dat with trigger in Cal using carbon_disc.cmd. But note good Ni doesn't penetrate into Cal. At position 7.

Changed trigger to Test Box with high discriminator. Cal and Test Box data streams are no longer synched. Accumulate Test Box data with muon discriminator anyway, just for diagnostic of daughters.

Using gsi00ni2.par for Test Box, and cal_setup.cmd for Cal.

Runs BN and RN 301, 302.

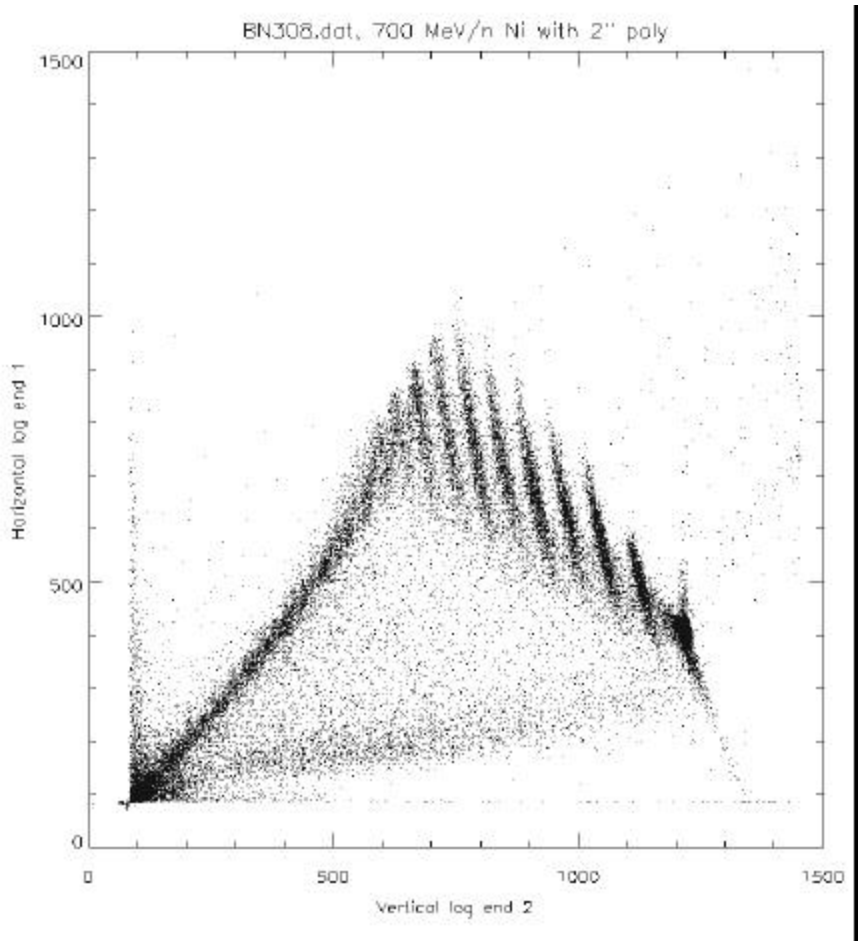
Raised Paddle PMT HV by 200V to increase sensitivity to Ni fragments. Paddle PMT HV is now set to same as Carbon runs.

Runs BN303 – 306. Runs RN304 and 305.

5B. 700 MeV/n Ni, Test Box, 0 deg, 2" poly.

Angle is 0 degs. Table height is 21.2 cm on fiducial. Beam enters test box at horizontal 1/6, counting from 0. 2" poly upstream. Beam fragments enter calorimeter in a big splat. No poly upstream. Run positions 7 (1601Ω), 9 (1719Ω). 20k triggers position 9. Long exposure (50k) at position 7.

Runs 307 – 308.



Restored trigger to Cal TEM. This re-synchs Cal and Test Box data streams. Purpose is to study deeper fragmenting interactions of Ni, the charge changes of more than several. It might be possible to image the small daughters separately from the big one. Run position 7 (1601) for 50k triggers.

gsi00ni2.par and carbon_disc.cmd. Use carbon threshold to ensure that at least one daughter is big.

Run 309.

5A. 700 MeV/n Ni, Test Box, 0 deg, no poly.

Angle is 0 degs. Table height is 21.2 cm on fiducial. Beam enters test box at horizontal 1/6, counting from 0. Beam fragments enter calorimeter in a big splat. No poly upstream. Run position 7 (1601Ω). Purpose is to study deeper fragmenting interactions of Ni, the charge changes of more than several. It might be possible to image the small daughters separately from the big one. Run position 7 (1601) for 50k triggers.

gsi00ni2.par and carbon_disc.cmd. Use carbon threshold to ensure that at least one daughter is big.

Run 310, le test de Gilles le Magnifique.

*** Change trigger back to Test Box. gsiNi2f.par and cal_setup.cmd. ***

5C. Fast shaping, 700 MeV/n Ni, Test Box, 0 deg, no poly.

Angle is 0 degs. Table height is 11.9 cm on fiducial. No poly upstream. Run position 8 (1660Ω) for 30k events.

Run 311.

5D. Fast shaping, 700 MeV/n Ni, Test Box, 0 deg, 2" poly.

Angle is 0 degs. Table height is 11.9 cm on fiducial. 2" poly upstream. Run position 8 (1660Ω) for 30k events.

Run 312.

*** Restore shape time 3. gsi00ni2.par and cal_setup.cmd. ***

5B. 700 MeV/n Ni, Test Box, 0 deg, 2" poly.

Angle is 0 degs. Table height is 11.9 cm on fiducial. 2" poly upstream. Run positions 6 (1542Ω), 7 (1601Ω), and 8 (1660Ω) for 30k.

Runs 313 – 315.

5A. 700 MeV/n Ni, Test Box, 0 deg, no poly.

Angle is 0 degs. Table height is 11.9 cm on fiducial. No poly upstream. Run positions 6 (1542Ω) for 60k, 7 (1601Ω) and 8 (1660Ω) for 30k.

Runs 316 – 318.

5A. 700 MeV/n Ni, Test Box, 0 deg, no poly.

Angle is 0 degs. Table height is 15.0 cm on fiducial. No poly upstream. Run positions 5 (1483Ω), 7 (1601Ω). 30k and 50k.

Runs 319 – 320.

5A. 700 MeV/n Ni, Test Box, 0 deg, no poly.

Angle is 0 degs. Table height is 18.1 cm on fiducial. No poly upstream. Run position 7 (1601Ω). 30k.

Run 321.

Lost beam about 0400. Still a problem with the Ni source. Decided to skip final table height at 24.3 cm and remove Test Box while beam is gone.

*** Removed test box ***

gsi00ni2.par and carbon_disc.cmd

6A. 700 MeV/n Ni, 0 deg, no poly.

Forgot to switch trigger. OK, it's early in the morning. So, no CAMAC data is being logged. Angle is 0 degs. Table height is 18.1 cm on fiducial. No poly upstream. Run positions are referenced to Calorimeter 10x10 array.

Run 322.

Switched trigger back to Cal TEM.

6A. 700 MeV/n Ni, 0 deg, no poly.

Angle is 0 degs. Table height is 18.1 cm on fiducial. No poly upstream. Run positions are referenced to Calorimeter 10x10 array. Run positions 2, 4, 5, 7, 9. 30k points per position.

Runs 323 – 327.

6A. 700 MeV/n Ni, 0 deg, no poly.

Angle is 0 degs. Table height is 24.3 cm on fiducial. No poly upstream. Run positions are referenced to Calorimeter 10x10 array. Run positions 1, 3, 6, 8, 10. 30k points per position.

Runs 328 – 332.

****** Das ist Alles! *********

Action Items